

SEARCH REQUEST FORM

Scientific and Technical Information Center

Requester's Full Name: Timothy C. Vanooy Examiner #: 69420 Date: 19 OCT 2006
 Art. Unit: 1754 Phone Number ~~30~~ 272-8158 Serial Number: 10-535,190
 Mail Box and Bldg/Room Location: REM 9A28 Results Format Preferred (circle): PAPER DISK E-MAIL

If more than one search is submitted, please prioritize searches in order of need.

 Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: HYDROGEN TRAPPER COMPOUND, METHOD FOR THE PRODUCTION AND USES THEREOF

Inventors (please provide full names): Sylvie CAMARO; Quentin RAGETLY;
Chantal RIGLET-MARTIAL

Earliest Priority Filing Date: Aug. 25, 2004 (371 DATE)

For Sequence Searches Only Aug. 29, 2003 (FOREIGN PRIORITY DATE)
 Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.

LOOKING FOR A COMPOUND OF THE GENERAL FORMULA:

$MX(OH)$

M IS A DIVALENT TRANSITION METAL (SUCH AS Cr, Mn, Fe, Co, Ni, Cu OR Zn)

X IS S, Se, Te OR Po

O IS OXYGEN

H IS HYDROGEN

(PLEASE SEE THE ATTACHED CLAIMS 1-3).

Co AND Ni PREFERRED

S IS PREFERRED

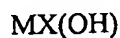
STAFF USE ONLY

		Type of Search	Vendors and cost where applicable
Searcher: <u>ES</u>	NA Sequence (#) _____	STN <u>\$ 322.97</u>	
Searcher Phone #: _____	AA Sequence (#) _____	Dialog _____	
Searcher Location: _____	Structure (#) <u>✓ (1)</u>	Questel/Orbit _____	
Date Searcher Picked Up: _____	Bibliographic <u>✓ (and)</u>	Dr. Link _____	
Date Completed: <u>10-25-06</u>	Litigation <u>✓</u>	Lexis/Nexis _____	
Searcher Prep & Review Time: <u>10</u>	Fulltext _____	Sequence Systems _____	
Clerical Prep Time: _____	Patent Family _____	WWW/Internet _____	
Online Time: <u>95</u>	Other _____	Other (specify) _____	

IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Previously Presented): A hydrogen-trapping compound, comprising at least one mineral compound of general formula:



wherein:

- M represents a divalent transition element;
- O represents an oxygen atom;
- X represents an atom of group 16 of the Periodic Table of the Elements, excluding O; and
- H represents a hydrogen atom.

Claim 2 (Previously Presented): The compound of Claim 1, wherein M is selected from the group consisting of Cr, Mn, Fe, Co, Ni, Cu and Zn.

Claim 3 (Previously Presented): The compound of Claim 1, wherein X is selected from the group consisting of S, Se, Te and Po.

Claim 4 (Previously Presented): The compound of Claim 1, wherein M is Co or Ni.

Claim 5 (Previously Presented): The compound of Claim 1, wherein X is S.

Claim 6 (Previously Presented): A process for manufacturing the hydrogen-trapping compound of Claim 1 comprising:

mixing, in aqueous solution, at least one dissolved salt of dissolved X^{2-} and at least one dissolved metal salt of M forming a precipitate of the at least one metal sulphide of the formula $MX(OH)$; wherein the precipitate is suspended in the aqueous phase.

Claim 7 (Previously Presented): The process of Claim 6, wherein the X^{2-} salt is Na_2 , $(NH_4)_2$, Li_2 , K_2 or a mixture thereof.

Claim 8 (Previously Presented): The process of Claim 6, wherein the metal salt of M is selected from the group consisting of: $MSO_4 \cdot xH_2O$; $M(NO_3)_2$; $M(ClO_4)_2 \cdot xH_2O$; and MCl_2 ; wherein M represents a divalent transition element; and wherein x is a number greater than or equal to zero.

Claim 9 (Previously Presented): The process of Claim 8, wherein M is Co or Ni.

Claim 10 (Previously Presented): The process of Claim 8, wherein X is S.

Claim 11 (Previously Presented): The process of Claim 6, wherein the mixing in aqueous solution is carried out a pH of 4 to 12.

Claim 12 (Currently Amended): The process of Claim 6, wherein the molar ratio of the concentrations $[X^{2-}]/[M^{2+}]$ is from ~~7/8 to 1.5~~ 0.875:1 to 1.5:1.

Claim 13 (Previously Presented): The process of Claim 6, wherein the at least one precipitated metal salt is extracted from the suspension in the aqueous phase; wherein extraction comprises: filtering, washing with water, and drying.

Claim 14 (Currently Amended): A method of encapsulating a solid waste comprising:

- a) encapsulating the solid waste and the hydrogen-trapping compound of Claim 1 with an organic encapsulation material to form an encapsulant; wherein prior to encapsulation the solid waste, the hydrogen-trapping compound, and the organic encapsulation material are heated; and wherein prior to encapsulation the organic encapsulation material is liquefied;
- b) cooling the encapsulant; and
- c) solidifying the encapsulant.

Claim 15 (Previously Presented): The method of Claim 14, wherein the organic encapsulation material is a bitumen.

Claim 16 (Previously Presented): The method of Claim 14, wherein the solid waste is non-radioactive.

Claim 17 (Previously Presented): The method of Claim 14, wherein the solid waste is radioactive.

Claim 18 (Previously Presented): The method of Claim 15, wherein the hydrogen-trapping compound is mixed with the bitumen in an amount of 1.5 to 82% in total, expressed as mass of trapping compound with respect to the mass of bitumen.

Claim 19 (Previously Presented): The method of Claim 17, wherein the radioactive waste represents at least 45 wt% of the total mass of the solid waste encapsulated with the composite organic material.

Claim 20 (Previously Presented): The method of Claim 17, further comprising chemically coprecipitating the radioactive waste in solid form and the hydrogen-trapping compound in order to obtain a solid phase comprising a mixture of the radioactive solid waste and of the hydrogen-trapping compound prior to being encapsulated.

Claim 21 (Previously Presented): An organic material for encapsulating radioactive waste, comprising an organic encapsulation material and at least one hydrogen-trapping compound of Claim 1.

Claim 22 (Previously Presented): The organic material for encapsulating radioactive waste of Claim 21, wherein the organic encapsulation material is a bitumen.

Claim 23 (Previously Presented): The organic material for encapsulating radioactive waste of Claim 21, wherein the at least one hydrogen-trapping compound represents in total an amount of 1.5 to 82% expressed as mass of trapping compound with respect to the mass of bitumen.

Claims 24-26 (Canceled).

Claims 27 (Previously Presented): A method for trapping hydrogen comprising contacting the hydrogen with the compound of Claim 1.

Claim 28 (Previously Presented): The method of Claim 27, wherein the hydrogen is produced by radiolysis of a radioactive waste and wherein the trapping is conducted within an

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Reply to Office Action of June 27, 2006

organic material which encapsulates the both the hydrogen-trapping compound and the radioactive waste.

Claim 29 (Previously Presented): The method of Claim 28, wherein the organic material is bitumen.

=> FILE REG

FILE 'REGISTRY' ENTERED ON 25 OCT 2006

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=> DISPLAY HISTORY FULL L1-

FILE 'HCAPLUS' ENTERED ON 25 OCT 2006

L1 7 SEA CAMARO ?/AU
L2 1 SEA RAGETLY ?/AU
L3 305 SEA RIGLET ?/AU OR MARTIAL ?/AU OR RIGLET MARTIAL ?/AU
OR MARTIAL RIGLET ?/AU
L4 1 SEA L1 AND L2 AND L3

FILE 'REGISTRY' ENTERED ON 25 OCT 2006

L5 1 SEA 1333-74-0
L6 1 SEA 7782-39-0
L7 1 SEA 10028-17-8
L8 1 SEA 118812-67-2

FILE 'HCA' ENTERED ON 25 OCT 2006

L9 379673 SEA L5 OR L6 OR L7
L10 70629 SEA (L5 OR L6 OR L7 OR HYDROGEN# OR H2 OR H OR DEUTERIUM#
OR D2 OR TRITIUM# OR T2) (2A) (TRAP? OR SORB? OR SORP? OR
ADSORB? OR ADSORP? OR ABSORP? OR ABSORB? OR CHEMISORB?
OR CHEMISORP? OR CHEMICOSORB? OR CHEMICOSORP?)
L11 36273 SEA (L5 OR L6 OR L7 OR HYDROGEN# OR H2 OR H OR DEUTERIUM#
OR D2 OR TRITIUM# OR T2) (2A) (STORE# OR STORING# OR
STOREING# OR STORAG? OR FIX OR FIXES OR FIXED OR FIXING#
OR FIXATION? OR STABIL? OR STABL?)
L12 68486 SEA (RADIOACT? OR NUCLEAR? OR ATOMIC? OR RADIOISOTOP?) (2A
) (WAST? OR ROD OR RODS) OR SPENT? (2A) (FUEL? OR ROD OR
RODS) OR FUEL? (2A) (ROD OR RODS)
L13 QUE (70 OR 71)/SC, SX
L14 134412 SEA BITUM!N? OR TAR OR TARS OR TARRED OR TARRING# OR
TARLIK? OR ASPHALT?
L15 9 SEA L8
L16 1 SEA L15 AND ((L9 OR L10 OR L11 OR L12 OR L13 OR L14))

FILE 'LREGISTRY' ENTERED ON 25 OCT 2006

L17 65 SEA (T1 OR T2 OR T3 OR B2)/PG (L) O/ELS (L) H/ELS (L) (S
OR SE OR TE OR PO)/ELS (L) 4/ELC.SUB
L18 3 SEA (T1 OR T2 OR T3 OR B2)/PG (L) 1/O (L) 1/H (L) (1/S
OR 1/SE OR 1/TE OR 1/PO) (L) 4/ELC.SUB
L19 STR
L23 STR 118812-67-2

FILE 'REGISTRY' ENTERED ON 25 OCT 2006

L24 SCR 1918
 L25 0 SEA SSS SAM L23 AND L24
 L26 STR L23
 L27 0 SEA SSS SAM L26 AND L24
 L28 5 SEA SSS FUL L26 AND L24
 L29 1 SEA L28 AND L8
 SAV L28 VAN190/A
 E CHROMIUM HYDROXIDE SULFIDE/CN
 E MANGANESE HYDROXIDE SULFIDE/CN
 E NICKEL HYDROXIDE SULFIDE/CN
 E COPPER HYDROXIDE SULFIDE/CN
 E ZINC HYDROXIDE SULFIDE/CN
 L30 1 SEA "ZINC HYDROXIDE SULFIDE"/CN

FILE 'HCA' ENTERED ON 25 OCT 2006

L31 16 SEA L28 OR L30
 L32 1 SEA L31 AND ((L9 OR L10 OR L11 OR L12 OR L13 OR L14))
 L33 1 SEA L16 OR L32
 L34 15 SEA (L15 OR L31) NOT L33
 L35 14 SEA L34 AND 1840-2004/PY,PRY

FILE 'REGISTRY' ENTERED ON 25 OCT 2006

=> D L28 QUE STAT

L24 SCR 1918
 L26 STR

² O-----M-----G1
 E1 1 3

VAR G1=S/SE/TE/PO

NODE ATTRIBUTES:

HCOUNT IS E1 AT 2
 CONNECT IS E2 RC AT 1
 DEFAULT MLEVEL IS ATOM
 DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:

RING(S) ARE ISOLATED OR EMBEDDED
 NUMBER OF NODES IS 3

STEREO ATTRIBUTES: NONE

L28 5 SEA FILE=REGISTRY SSS FUL L26 AND L24

100.0% PROCESSED 541429 ITERATIONS

5 ANSWERS

SEARCH TIME: 00.00.03

=> FILE HCA

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=> D L33 1 CBIB ABS HITSTR HITIND

L33 ANSWER 1 OF 1 HCA COPYRIGHT 2006 ACS on STN

142:282227 **Hydrogen-sorbing** compound, its
fabrication, and uses. Camaro, Sylvie; Ragetly, Quentin; Riglet,
Martial Chantal (Commissariat a l'Energie Atomique, Fr.; Compagnie
Generale des Matieres Nucleaires; Cogema). Fr. Demande FR 2859202
A1 20050304, 38 pp. (French). CODEN: FRXXBL. APPLICATION: FR
2003-50475 20030829.

AB The **H-sorbing** compd. includes ≥ 1 metal
salt of a formula $MX(OH)$ (M = divalent transition metal, such as Co
or Ni; X = atom of classification group 16, such as S). The compd.
is effective to **trap** and release **H₂**. The compd.
finds applications in all the situations where **H₂** is liberated and
where it must be trapped, esp. for security reasons.

IT **118812-67-2**, Cobalt hydroxide sulfide ($Co(OH)S$)
(**hydrogen-sorbing** compd.)

RN 118812-67-2 HCA

CN Cobalt hydroxide sulfide ($Co(OH)S$) (9CI) (CA INDEX NAME)

HO—Co=S

IT **1333-74-0**, **Hydrogen**, uses **7782-39-0**,
Deuterium, uses **10028-17-8**, **Tritium**,
uses

(**hydrogen-sorbing** compd., its fabrication,
and uses)

RN 1333-74-0 HCA

CN Hydrogen (8CI, 9CI) (CA INDEX NAME)

H—H

RN 7782-39-0 HCA

CN Deuterium (7CI, 8CI, 9CI) (CA INDEX NAME)

D-D

RN 10028-17-8 HCA

CN Tritium (8CI, 9CI) (CA INDEX NAME)

T-T

IC ICM C01B003-00

ICS C01G051-04; G21F009-36

CC 48-1 (Unit Operations and Processes)

Section cross-reference(s): 52, 71

ST **hydrogen storage** compd; **sorbent**
hydrogen

IT **Radioactive wastes**
(**hydrogen-sorbing** compd.)

IT **Bitumens**
(**hydrogen-sorbing** compd. for processing of)

IT **Sorbents**
Storage
(**hydrogen-sorbing** compd., its fabrication,
and uses)

IT **118812-67-2**, Cobalt hydroxide sulfide (Co(OH)S)
(**hydrogen-sorbing** compd.)

IT **1333-74-0**, **Hydrogen**, uses **7782-39-0**,
Deuterium, uses **10028-17-8**, **Tritium**,
uses
(**hydrogen-sorbing** compd., its fabrication,
and uses)

=> D L35 1-14 CBIB ABS HITSTR HITIND

L35 ANSWER 1 OF 14 HCA COPYRIGHT 2006 ACS on STN

141:95768 Potentiodynamic and electron-microscopy investigations of new anodic materials. Stefanov, Y.; Dobrev, T. (Institute of Physical Chemistry, Bulgarian Academy of Sciences, Sofia, 1113, Bulg.). Journal of the University of Chemical Technology and Metallurgy, 38(2), 485-490 (English) **2003**. CODEN: JUCTB3. ISSN: 1311-7629. Publisher: University of Chemical Technology and Metallurgy.

AB The mechanism of the anodic processes taking place on the surface of the lead-cobalt composite electrodes during the zinc electrowinning from model sulfate electrolytes have been established by

potentiodynamic investigations. On the basis of the obtained cyclic voltammograms information about the corrosion rate of the composite anodes in the lead dioxide region is obtained. The influence of the preprocessing of the lead plate and of the org. additives in the electrolyte for deposition of lead-cobalt coatings on this process is studied. SEM observations showed a nucleus typical "ear" structure on the lead-cobalt composite coatings. The presence of such a structure provides larger surface and leads to depolarization of the oxygen evolution reaction resp.

IT **118812-67-2**, Cobalt hydroxide sulfide CoOHS
(electrodeposition of lead-cobalt alloy on lead in prepn. of lead-cobalt composite electrodes in soln. contg.)
RN 118812-67-2 HCA
CN Cobalt hydroxide sulfide (Co(OH)S) (9CI) (CA INDEX NAME)

HO-Co=S

CC 72-8 (Electrochemistry)
Section cross-reference(s): 56, 67
IT 32849-69-7, Lead sulfamate **118812-67-2**, Cobalt hydroxide sulfide CoOHS
(electrodeposition of lead-cobalt alloy on lead in prepn. of lead-cobalt composite electrodes in soln. contg.)

L35 ANSWER 2 OF 14 HCA COPYRIGHT 2006 ACS on STN
140:328490 Electrochemical and XPS investigations of Zn-Co sulphide coatings. Valiuliene, Genovaite; Zieliene, Albina; Jasulaitiene, Vitalija (Laboratory of Redox Processes, Institute of Chemistry, Vilnius, LT-2600, Lithuania). Chemija, 14(3), 128-134 (English) **2003**. CODEN: CHMJES. ISSN: 0235-7216. Publisher: Lietuvos Mokslu Akademijos Leidykla.

AB The electrochem. behavior of new coatings deposited on a glassy C electrode from a soln. of mixed Zn(II)-Co(II)-NH₃ complexes using Na₂S as a sulfidation agent was studied in 0.1M KClO₄ and 0.05M H₂SO₄ solns. In the case when the sulfide coating is reduced, one cathodic current peak attributed to CoOHS redn. is obsd. in the CV at E approx. -0.67 V. In the anodic region, the current peaks are assocd. with oxidn. of the products of Co sulfides redn. and nonreduced Co compds. Modifying the coating with Cu(II) ions oxidn.-redn. takes place, and nonstoichiometric Cu sulfide and S are formed. The emerged peak of S redn. at E approx. -0.5 V shows that along with Co compds. ZnS is present in the coating. XPS data showed that the coating is a mixt. of sulfide and oxide Co and Zn compds. - ZnS, CoOHS, CoS, Co(OH)₂, CoO, ZnO, Zn(OH)₂.

IT **118812-67-2**, Cobalt hydroxide sulfide co(oh)s
(formation in sulfide coating on glassy C electrode from soln. of Zn(II)-Co(II)-NH₃ complexes using Na₂S as sulfidation agent in

KClO₄ and H₂SO₄ solns. and electrochem. and XPS study of Zn-Co sulfide coatings)

RN 118812-67-2 HCA

CN Cobalt hydroxide sulfide (Co(OH)S) (9CI) (CA INDEX NAME)

HO-Co=S

CC 72-2 (Electrochemistry)

Section cross-reference(s): 66, 73

IT 1307-96-6, Cobalt oxide coo, properties 1314-13-2, Zinc oxide, properties 1314-98-3, Zinc sulfide, properties 1317-42-6, Cobalt sulfide cos 20427-58-1, Zinc hydroxide 21041-93-0, Cobalt hydroxide co(oh)₂ **118812-67-2**, Cobalt hydroxide sulfide co(oh)s

(formation in sulfide coating on glassy C electrode from soln. of Zn(II)-Co(II)-NH₃ complexes using Na₂S as sulfidation agent in KClO₄ and H₂SO₄ solns. and electrochem. and XPS study of Zn-Co sulfide coatings)

L35 ANSWER 3 OF 14 HCA COPYRIGHT 2006 ACS on STN

139:172740 Composition of the Cobalt Sulfide Coating after Its Electrochemical Reduction. Valiuliene, G.; Zeliene, A.; Jasulaitiene, V.; Mozginskiene, I. (Institute of Chemistry, Vilnius, Lithuania). Russian Journal of Applied Chemistry (Translation of Zhurnal Prikladnoi Khimii), 76(1), 71-75 (English) **2003**. CODEN: RJACEO. ISSN: 1070-4272. Publisher: MAIK Nauka/Interperiodica Publishing.

AB XPS was used to study the compn. of the initial and electrochem. reduced cobalt coating formed by the adsorption procedure involving treatment of a carbon glass electrode in a soln. of Co(II) ammine complexes, hydrolytic washing in water, and conversion to sulfide in Na₂S soln.

IT **118812-67-2**, Cobalt hydroxide sulfide (Co(OH)S) (cobalt sulfide coating compn. before and after electrochem. redn. by XPS)

RN 118812-67-2 HCA

CN Cobalt hydroxide sulfide (Co(OH)S) (9CI) (CA INDEX NAME)

HO-Co=S

CC 79-6 (Inorganic Analytical Chemistry)

IT 1307-86-4, Cobalt hydroxide (Co(OH)₃) 1317-42-6, Cobalt sulfide (CoS) 7440-48-4, Cobalt, analysis 21041-93-0, Cobalt hydroxide (Co(OH)₂) 32702-66-2 **118812-67-2**, Cobalt hydroxide sulfide (Co(OH)S)

(cobalt sulfide coating compn. before and after electrochem.)

redn. by XPS)

L35 ANSWER 4 OF 14 HCA COPYRIGHT 2006 ACS on STN

137:390322 Investigation of the interaction between Co sulfide coatings and Cu(I) ions by cyclic voltammetry and XPS. Valiuliene, G.; Zieliene, A.; Vinkevicius, J. (Institute of Chemistry, Vilnius, 2600, Lithuania). Journal of Solid State Electrochemistry, 6(6), 396-402 (English) 2002. CODEN: JSSEFS. ISSN: 1432-8488. Publisher: Springer-Verlag.

AB The interaction between the Co sulfide coating formed on a glassy C electrode and Cu(I)-NH₃ complexes soln. was studied by cyclic voltammetry in 0.1M KClO₄, 0.1M NaOH and 0.05M H₂SO₄ solns. After treating the Co sulfide coating formed by 2 deposition cycles with Cu(I)-NH₃ complexes (0.4M, pH 8.8-9.0, $\tau = 180$ s, $T = 25 \pm 1^\circ$), an exchange occurs between the coating components and Cu(I). Cu(I) substitutes 75% of the Co(III) compds. present in the coating (.apprx. 1.81×10^{-7} mol cm⁻²) because of Cu₂O (1.36×10^{-7} mol cm⁻²) formation. The rest of the Co(II) and Co(III) sulfide compds. are also replaced by Cu with formation of Cu₂-xS with a stoichiometric coeff. close to 2 (.apprx. 1.9). After modifying the Co sulfide coatings with Cu(I) ions, the total amt. of metal (Co + Cu) increases, owing to the sorption of Cu(I) compds. The no. of deposition cycles decreases from 3 to 1.5 [1 cycle involves Co sulfide layer formation and 0.5 cycle is attributed to modifying by Cu(I) ions]. The coatings modified in the above-mentioned manner may be successfully used for plastic electrochem. metalization as Cu₂-xS coatings formed by 3 deposition cycles.

IT 118812-67-2, Cobalt hydroxide sulfide co(oh)s
(formation by three deposition cycles in cyclic voltammetry in XPS study and interaction between the Co sulfide coating formed on glassy C electrode and Cu(I)-ammine complexes was studied by cyclic voltammetry)

RN 118812-67-2 HCA

CN Cobalt hydroxide sulfide (Co(OH)S) (9CI) (CA INDEX NAME)

HO-Co=S

CC 72-2 (Electrochemistry)

Section cross-reference(s): 67

IT 1307-96-6, Cobalt oxide coo, properties 1317-42-6, Cobalt sulfide cos 21041-93-0, Cobalt hydroxide co(oh)₂ 32702-66-2, Sulfurous acid, cobalt(2+) salt (1:1) 118812-67-2, Cobalt hydroxide sulfide co(oh)s

(formation by three deposition cycles in cyclic voltammetry in XPS study and interaction between the Co sulfide coating formed on glassy C electrode and Cu(I)-ammine complexes was studied by

cyclic voltammetry)

L35 ANSWER 5 OF 14 HCA COPYRIGHT 2006 ACS on STN

137:172299 ERDA analysis of $ZnS_x(OH)_y$ thin films obtained by chemical bath deposition. Neve, Sven; Bohne, Wolfgang; Rohrich, Jorg; Scheer, Roland (Hahn-Meitner-Institut Berlin GmbH, Berlin, D-14109, Germany). Materials Research Society Symposium Proceedings, 668(II-VI Compound Semiconductor Photovoltaic Materials), H5.3/1-H5.3/6 (English) **2001**. CODEN: MRSPDH. ISSN: 0272-9172. Publisher: Materials Research Society.

AB Thin films of Zn-compds. grown in a chem. bath have been studied by Elastic Recoil Detection Anal. (ERDA). The bath contained zinc acetate, thiourea and complexing agents such as ammonia and hydrazine. Large amts. of hydrogen and oxygen are detected within all samples. A strong effect of the pH of the soln. is revealed: At high pH (>11.5) mainly ZnS growth takes place, while at lower pH $Zn(OH)_2$ is the dominant product. Hence the pH of the soln. can be used to adjust the film stoichiometry. Deposition of Zn-compd. films is possible without ammonia in the soln. while presence of hydroxide ions and hydrazine species is necessary. It is proposed that film formation takes place via a complex combining hydrazine and hydroxide ligands.

IT **329761-31-1**, Zinc hydroxide sulfide
(thin films; elastic recoil detection anal. for characterization of chem. bath deposition of $ZnS_x(OH)_y$ thin films)

RN 329761-31-1 HCA

CN Zinc hydroxide sulfide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
HO	x	14280-30-9
S	x	7704-34-9
Zn	x	7440-66-6

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 42, 49

IT **329761-31-1**, Zinc hydroxide sulfide
(thin films; elastic recoil detection anal. for characterization of chem. bath deposition of $ZnS_x(OH)_y$ thin films)

L35 ANSWER 6 OF 14 HCA COPYRIGHT 2006 ACS on STN

137:100435 Investigation of the interaction between cobalt sulfide coatings and $Ag(I)$ ions using cyclic voltammetry in $KClO_4$ and NaOH aqueous solutions and X-ray photoelectron spectroscopy. Vinkevicius, J.; Svickus, N.; Jasulaitiene, V.; Gudaviciute, I. (Institute of Chemistry, Vilnius, 2600, Lithuania). Journal of Solid State Electrochemistry, 6(3), 209-214 (English) **2002**

. CODEN: JSSEFS. ISSN: 1432-8488. Publisher: Springer-Verlag.

AB Cobalt sulfide coatings have been investigated by means of cyclic voltammetry in 0.1 M KClO₄ and 0.1 M NaOH solns. and analyzed using XPS. They have been shown to contain CoS(OH), CoS and Co(OH)₂. After treating such Co sulfide coatings with AgNO₃ soln., their compn. changes: both the cobalt and oxygen content decreases and Ag (up to 85 at%) appears in the coating as Ag₂S, Ag₂O and metallic Ag. Co(II) compds. react with Ag⁺ ions according to an exchange reaction [CoS + 2Ag⁺ + 2H₂O → Ag₂S + Co(OH)₂ + 2H⁺]. In the course of the reaction of Co(OH)₂ with silver ions, a redox process occurs, giving metallic silver [Co(OH)₂ + Ag⁺ + H₂O → Ago + Co(OH)₃ + H⁺ or Co(OH)₂ + Ag⁺ → Ago + CoO(OH) + H⁺]. Ag₂S redn. takes place at more pos. potentials than Cu redn.; therefore sulfide layers of cobalt modified with silver ions, unlike unmodified ones, may be plated with Cu from both acid and alk. electrolytes.

IT **118812-67-2**, Cobalt hydroxide sulfide Co(OH)S
(occurrence in cobalt sulfide coatings and interaction with silver (I) ions)

RN 118812-67-2 HCA

CN Cobalt hydroxide sulfide (Co(OH)S) (9CI) (CA INDEX NAME)

HO—Co=S

CC 72-2 (Electrochemistry)

Section cross-reference(s): 73, 78

IT 21041-93-0, Cobalt hydroxide Co(OH)₂ **118812-67-2**, Cobalt hydroxide sulfide Co(OH)S
(occurrence in cobalt sulfide coatings and interaction with silver (I) ions)

L35 ANSWER 7 OF 14 HCA COPYRIGHT 2006 ACS on STN

135:216538 Investigation of cobalt sulphide coatings using the method of X-ray photoelectron spectroscopy. Vinkevicius, J.; Svickus, N.; Jasulaitiene, V. (Institute of Chemistry, Vilnius, LT-2600, Lithuania). Transactions of the Institute of Metal Finishing, 79(1), 33-37 (English) **2001**. CODEN: TIMFA2. ISSN: 0020-2967. Publisher: Institute of Metal Finishing.

AB Regularities in the formation of cobalt sulfide layers (one cycle of the formation includes adsorption of Co ammoniates on the surface, hydrolysis, and sulfidation in Na₂Sn (n=1-4) soln.) and the compn. of the coatings obtained have been investigated by the method of XPS. It has been detd. that before sulfidation, i.e. after the stage of rinsing-hydrolysis, in addn. to Co (II) compds. (Co(OH)₂) one can find in the coating the Co (III) compd. CoOOH formed due to the action of atm. oxygen, and water. Co (II) compds. dominate on the coating surface, while those of Co (III) do so in its depth. The sulfite found in the coating after sulfidation can be assocd.

with a redox reaction:.. $6\text{CoOOH} + 6\text{S}^{2-} + 3\text{H}_2\text{O} \rightarrow \text{CoSO}_3 + 5\text{CoS} + 12\text{OH}^-$. It is supposed that CoSOH found in the coating can be formed by two ways, i.e. in the course of CoS oxidn. with O_2 and H_2O to Co (III) :.. $4\text{CoS} + \text{O}_2 + 2\text{H}_2\text{O} \rightarrow 4 \text{CoSOH}$. Or due to direct interaction of CoOOH with Na_2S . $\text{CoOOH} + \text{Na}_2\text{S} + \text{H}_2\text{O} \rightarrow \text{CoSOH} + 2\text{NaOH}$. It has been shown that with increasing no. of coating formation cycles and temp. of the solns., as well as with aging the samples or forming the coating with a sulfidation agent with a longer sulfide chain - tetrasulfide ($n = 4$), the amt. of Co (III) formed increases. All the components of the coating are supposed to be reduced to COO in the course of nickel electroplating on Co sulfide coating.

- IT **118812-67-2**, Cobalt hydroxide sulfide (Co(OH)S)
 (compn. and regularities in the formation of cobalt sulfide layers formed by adsorption of Co ammoniates on the surface, hydrolysis, and sulfidation in Na_2Sn soln.)
- RN 118812-67-2 HCA
- CN Cobalt hydroxide sulfide (Co(OH)S) (9CI) (CA INDEX NAME)

$\text{HO}-\text{Co}=\text{S}$

- CC 66-4 (Surface Chemistry and Colloids)
 Section cross-reference(s): 42, 67

- IT 12016-80-7, Cobalt oxyhydroxide 32702-66-2, Cobalt sulfite
118812-67-2, Cobalt hydroxide sulfide (Co(OH)S)
 (compn. and regularities in the formation of cobalt sulfide layers formed by adsorption of Co ammoniates on the surface, hydrolysis, and sulfidation in Na_2Sn soln.)

L35 ANSWER 8 OF 14 HCA COPYRIGHT 2006 ACS on STN

134:224991 High-efficiency Cd-free CIGSS thin-film solar cells with solution grown zinc compound buffer layers. Ennaoui, A.; Siebentritt, S.; Lux-Steiner, M. C.; Riedl, W.; Karg, F. (Hahn-Meitner-Institut Bereich Solarenergieforschung, Berlin, D-14109, Germany). Solar Energy Materials and Solar Cells, 67(1-4), 31-40 (English) **2001**. CODEN: SEMCEQ. ISSN: 0927-0248. Publisher: Elsevier Science B.V..

- AB Zn-compds. Zn(X,OH) ($\text{X}=\text{S,Se}$) buffer layers have been deposited by chem. bath (CBD) process on Cu(In,Ga)(S,Se)_2 (CIGSS) with the aim of developing Cd-free CIGSS-based devices. The films are produced in alk. aq. soln. contg. ZnSO_4 , ammonia NH_3 and $\text{XC(NH}_2)_2$. Optimum deposition conditions were established. The temp. (T_{sub}) of the chem. bath is found to be crit. for the device quality. The thickness and good surface coverage were controlled by XPS-UPS photoemission spectroscopy. SEM study showed that the growth of ZnSe nuclei on CIGSS proceeds in lateral direction. Once the surface is covered the growth takes place in vertical direction .

The ZnSe clusters grow in size and their elongated shapes cover the CIGSS surface. High efficiency of over 13% was obtained for both CIGSS/Zn(S,OH) and CIGSS/Zn(Se,OH)-based solar cells. Solar cells with CIGSS/Zn(Se,OH)x/ZnO/MgF2 structure show an active area efficiency up to 15.7%. Using Zn(Se,OH) buffer layer, efficiency of 11.7% was achieved with a 20 cm2 aperture-area monolithic minimodule.

IT **329761-31-1**, Zinc hydroxide sulfide
(high-efficiency Cd-free Cu(In,Ga)(S,Se) thin-film solar cells
with soln. grown zinc compd. buffer layers)
RN 329761-31-1 HCA
CN Zinc hydroxide sulfide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
HO	x	14280-30-9
S	x	7704-34-9
Zn	x	7440-66-6

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 76

IT 1314-13-2, Zinc oxide, uses 110758-29-7, Copper gallium indium
selenide sulfide (Cu(Ga,In)(Se,S)2) 220621-12-5, Zinc hydroxide
selenide **329761-31-1**, Zinc hydroxide sulfide
(high-efficiency Cd-free Cu(In,Ga)(S,Se) thin-film solar cells
with soln. grown zinc compd. buffer layers)

L35 ANSWER 9 OF 14 HCA COPYRIGHT 2006 ACS on STN

134:224990 Progress in large-area Cu(In,Ga)Se2-based thin-film modules
with a Zn(O,S,OH)x buffer layer. Kushiya, K.; Tachiyuki, M.;
Nagoya, Y.; Fujimaki, A.; Sang, B.; Okumura, D.; Satoh, M.; Yamase,
O. (Central R&D Lab. (ARL), Showa Shell Sekiyu K.K., Kanagawa,
Atsugi, 243-0206, Japan). Solar Energy Materials and Solar Cells,
67(1-4), 11-20 (English) **2001**. CODEN: SEMCEQ. ISSN:
0927-0248. Publisher: Elsevier Science B.V..

AB Applying basically the same innovative and robust fabrication
technologies which, for the first time, led to the achievement of
remarkably high efficiency of 14.2% at an aperture area of 51.7 cm2
with a Zn(O,S,OH)x buffer layer, the following goals have been
targeted: (1) 13% efficiency on a 30 cm+30 cm module and (2)
establishment of the fabrication technologies to attain 140 yen/Wp
in the annual prodn. capacity of 100 MWp/a. The main focus is
currently on the technol. development (1) to increase the Voc
related to the CIGS absorber and (2) to improve the Jsc related to
the DC-sputtered ZnO window layer with a multilayered structure.
This contribution well explains the status and strategy of Showa
Shell Sekiyu K.K. on the R&D of CIGS-based thin-film modules to

achieve the above two goals by the end of FY2000.

IT **329761-31-1**, Zinc hydroxide sulfide
 (progress in large-area copper gallium indium selenide-based
 thin-film modules with a Zn(O,S,OH)_x buffer layer)
 RN 329761-31-1 HCA
 CN Zinc hydroxide sulfide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
HO	x	14280-30-9
S	x	7704-34-9
Zn	x	7440-66-6

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 76
 IT 1314-13-2, Zinc oxide, uses 111419-77-3, Copper gallium indium
 selenide (Cu(Ga,In)Se₂) 220621-12-5, Zinc hydroxide selenide
329761-31-1, Zinc hydroxide sulfide
 (progress in large-area copper gallium indium selenide-based
 thin-film modules with a Zn(O,S,OH)_x buffer layer)

L35 ANSWER 10 OF 14 HCA COPYRIGHT 2006 ACS on STN

115:120477 Theoretical study of the structure and stability of molecules
 and ions of HAO₂, HAS₂, HSAO, and HOAS with 16 valence electrons (A
 = B, Al, C⁺, Si⁺). Zyubina, T. S.; Charkin, O. P. (Inst. Nov. Khim.
 Probl., USSR). Zhurnal Neorganicheskoi Khimii, 36(3), 752-9
 (Russian) **1991**. CODEN: ZNOKAQ. ISSN: 0044-457X.

AB Nonempirical calcn. are presented of the structure, and stability of
 the title compds. using several basis sets (including diffusion
 functions) and taking into account the electron correlation by MP3
 method. The proton affinity of OAS, AO₂, AS₂ (A = B⁻, Al⁻, C, Si)
 is also studied.

IT **135947-77-2**, Aluminum hydroxide sulfide (Al(OH)S)
 (structure and stability of, nonempirical study of)

RN 135947-77-2 HCA
 CN Aluminum hydroxide sulfide (Al(OH)S) (9CI) (CA INDEX NAME)

HO-Al=S

CC 65-5 (General Physical Chemistry)
 IT 75-15-0, Carbon disulfide, properties 124-38-9, Carbon dioxide,
 properties 463-58-1, Carbon oxide sulfide (COS) 638-71-1
 7631-86-9, Silica, properties 13460-50-9, Boric acid (HBO₂)
 13759-10-9, Silicon sulfide (SiS₂) 13775-45-6, Thioboric acid
 (HBS₂) 14100-65-3, Borate (BO₂1-) 20653-98-9, Aluminate (AlO₂1-)
 24623-77-6, Aluminum hydroxide oxide (Al(OH)O) 52919-44-5

59348-21-9 59348-27-5 73323-39-4, Silicon oxide sulfide (SiOS)
 83995-90-8, Thioboric acid (HBOS) 99260-46-5, Thioborate (BOS1-)
 124374-79-4 124374-80-7 124504-54-7, Thioborate (BS21-)
135947-77-2, Aluminum hydroxide sulfide (Al(OH)S)
 135947-78-3, Aluminum oxide sulfide (AlO(SH)) 135947-79-4,
 Aluminum sulfide (AlS(SH)) 135947-80-7 135947-81-8 135947-82-9
 (structure and stability of, nonempirical study of)

L35 ANSWER 11 OF 14 HCA COPYRIGHT 2006 ACS on STN

110:77468 Mechanism of interaction of cobalt(III) dioximes with sodium hydroxymethylsulfinate. Bulusheva, N. E.; Fioletova, T. N.; Krichevskii, G. E.; Zakhar'in, D. S.; Reiman, S. I. (Mosk. Tekst. Inst., Moscow, USSR). Zhurnal Prikladnoi Khimii (Sankt-Peterburg, Russian Federation), 61(9), 2076-80 (Russian) **1988**. CODEN: ZPKHAB. ISSN: 0044-4618.

AB Moessbauer studies of the reaction of Co(III) dioxime with HOCH₂SO₂H·Na (I) in the redn. of vat dyes showed that the complex used as catalyst for reducing the vat dye is decompd. by the action of degrading products of I. The final product from the reaction of I with the Co(III) compds. is CoS, which is readily oxidized to Co(OH)S. CoS formation is facilitated by increasing the temp. or pH of the medium or by the presence of a vat dye in the soln.

IT **118812-67-2P**, Cobalt hydroxide sulfide (Co(OH)S)
 (formation of, in reaction of cobalt dioxime with sodium hydroxymethylsulfinate, vat dye redn. in relation to)

RN 118812-67-2 HCA

CN Cobalt hydroxide sulfide (Co(OH)S) (9CI) (CA INDEX NAME)

HO-Co=S

CC 41-1 (Dyes, Organic Pigments, Fluorescent Brighteners, and Photographic Sensitizers)

IT 1317-42-6P, Cobalt sulfide (CoS) **118812-67-2P**, Cobalt hydroxide sulfide (Co(OH)S)
 (formation of, in reaction of cobalt dioxime with sodium hydroxymethylsulfinate, vat dye redn. in relation to)

L35 ANSWER 12 OF 14 HCA COPYRIGHT 2006 ACS on STN

99:179200 Hydrothermal solutions and the migration of mercury. Belevantsev, V. I.; Gushchina, L. V.; Obolenskii, A. A. (USSR). Trudy Instituta Geologii i Geofiziki (Novosibirsk), 505, 5-42 (Russian) **1982**. CODEN: TGGSAB. ISSN: 0568-658X.

AB The possible chem. forms of Hg(II) and their relative content in sulfide-chloride, sulfide-carbonate-chloride, and sulfide-carbonate hydrothermal solns. are considered, based on thermodyn. calcns. and taking into account the compn. of fluid inclusions in minerals of Hg

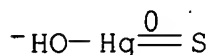
ore deposits. The distribution of the various complex ions of Hg(II) in these solns. are calcd. as a function of pH and temp. At high temps. even in moderately acidic sulfide-chloride solns., chloride and, to a lesser extent, chloride-hydrosulfide complexes are dominant. In sufficiently acidic sulfide-chloride solns. with low sulfide S concn. at low temps. the hydrosulfide complex becomes dominant. Over a short temp. interval near 150° in acidic sulfide-chloride solns. the effect of varying concns. of C's (the anal. concn. of S not bounded to Hg) becomes qual. opposite and some of the conclusions of I.L. Khodakovskii (1977) are applicable only within this narrow range. The Hg(HS)2, HgS(HS)-, and HgS22- complexes exist in solns. close to pH 7. In alk. solns. HgS22- is the dominant form. With the exception of some acidic sulfide-chloride solns. at high temp. the calcns. do not show commensurate concns. of S2- and Hg(II), i.e. generally nonequil. prevails. The effect of ionic strength is qual. opposite for acidic chloride solns. (at high temps.) and for alk. solns. (at all temps.).

IT **87652-92-4**

(in hydrothermal solns., mercury ore formation in relation to)

RN 87652-92-4 HCA

CN Mercurate(1-), hydroxythioxo- (9CI) (CA INDEX NAME)



CC 53-2 (Mineralogical and Geological Chemistry)

IT 7487-94-7, uses and miscellaneous 12135-13-6 12135-15-8
12325-02-9 13759-23-4 14024-34-1 14650-08-9 14988-07-9
26015-93-0 87652-91-3 **87652-92-4** 87652-93-5
87663-99-8

(in hydrothermal solns., mercury ore formation in relation to)

L35 ANSWER 13 OF 14 HCA COPYRIGHT 2006 ACS on STN

85:86697 A simple absorptiometric for determination of small amounts of sulfide ion. Rahim, S. A.; Abdulahhed, H. (Chem. Dep., Coll. Sci., Mosul, Iraq). Bulletin of the College of Science, University of Baghdad, Volume Date 1972, 12-13, 130-8 (English) **1973**.
CODEN: BCOSAF. ISSN: 0408-1927.

AB S2- was detd. spectrophotometrically by measuring the absorbance at 630-5 nm of solns. contg. Na2SO3 (for stabilizing the complex), Fe(III), a complexing agent, and NH4OH after developing a stable green color, probably arising from FeS+ or Fe(OH)S. Of the complexing agents studied, citrate was the best; the relative std. deviation was 1.16% in the detn. of 10 ppm S2- when citrate was used. The molar absorptivities and the ranges (ppm S2-) in which Beer's law was obeyed for the various complexing agents were:

citrate, 4.10 + 103, 4-14; 1,2-diaminopropanetetraacetic acid, 3.10 + 103, 2-12; [ethylenebis(oxyethylenenitrilo)]tetraacetic acid 3.15 + 103, 4-10; 1,2-diaminocyclohexanetetraacetic acid, 3.20 + 103, 2-16; and nitrilotriacetic acid (NTA), 5.2 + 103, 4-24.

IT **60149-44-2**

(spectrum and stabilization of)

RN 60149-44-2 HCA

CN Iron hydroxide sulfide (Fe(OH)S) (9CI) (CA INDEX NAME)

HO-Fe=S

CC 79-6 (Inorganic Analytical Chemistry)

IT **60149-44-2** 60173-22-0

(spectrum and stabilization of)

L35 ANSWER 14 OF 14 HCA COPYRIGHT 2006 ACS on STN

84:82424. Luminophore containing yttrium hydrosulfide activated with terbium. Amiryan, A. M.; Soshchin, N. P. (USSR). U.S.S.R. SU 497326 **19751230** From: Otkrytiya, Izobret., Prom.

Obraztsy, Tovarnye Znaki 1975, 52(48), 82. (Russian). CODEN: URXXAF. APPLICATION: SU 1973-1953139 19730731.

AB For increasing the energy yield and the luminosity where a nonflashing image is obsd. at the frequency of 50 Hz, the phosphor contains Mn or Re 1 + 10-3-1 + 10-1, Tb 2 + 10-2-20 mol.%.

IT **58553-40-5**

(phosphors contg.)

RN 58553-40-5 HCA

CN Yttrium hydroxide sulfide (Y(OH)S) (9CI) (CA INDEX NAME)

HO-Y=S

IC C09K

CC 73-3 (Spectra by Absorption, Emission, Reflection, or Magnetic Resonance, and Other Optical Properties)

Section cross-reference(s): 76

IT 7439-96-5, uses and miscellaneous 7440-15-5, uses and miscellaneous 7440-27-9, uses and miscellaneous **58553-40-5** (phosphors contg.)